

Chasing FT8 Awards, p. 96

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QRP Special

On the Cover: Christopher Tenev, K2QFA, of Lambertville, New Jersey, operates QRP portable while on a ski trip to Vail, Colorado. Story on page 12, details on page 93.

VHF PLUS

BY JIM WILSON, K5ND, * GUEST COLUMNIST

Six Meters — The Magic & Tragic Band An Introduction

As we continue our hunt for a new VHF+ editor, we are pleased this month to offer a guest column by Jim Wilson, K5ND, who has recently written a couple of e-books on six meters, aimed at beginners on the Magic Band (see "Behind the Bylines" for details). This article is a primer as well, great to read if you're not currently active on six, or to share with fellow hams who are "stuck" on HF or 2 meters and need a little encouragement to savor the magic of 50 MHz. — W2VU

I'm confident that you've heard of the Magic Band, six meters. And perhaps you have, at least from time to time, pressed the six-meter button on your HF rig. The good news is that there are often sporadic-E (E_s) openings coast-to-coast. These happen mostly during the summer months. The bad news is that there is often nada, nothing, zilch.

The band *is* magic. Unfortunately, it can make propagation disappear as well as appear, presto change-o. Even so,

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those openings when they do happen can be great fun. Plus, the signals will be loud and crystal clear no matter how much power you're running or how lame your antenna.

What is Six Meters?

For the uninitiated, the six-meter band runs from 50-54 MHz within the U.S. As such, it sits midway between the HF bands, ending with 30 MHz, and the higher VHF bands, starting with 144 MHz. In that position, it provides all forms of propagation familiar to both HF and VHF operators, as well as a few that are much more prevalent on six meters. For modes of operation, there's not only CW, SSB, and WSJT-X, but also FM simplex and repeaters.

Propagation Modes

The go-to propagation mode is E_s , which is reflections from the E-layer of the ionosphere (*Figure 1*). This crops up primarily in the summer but there are also a few times during the rest of the year, mostly in winter. Sometimes it's there, sometimes it's not. Ah yes, magic. Normal distances on E_s can range from a single hop's 1,500 miles to double and



Photo A. Three-element LFA Yagi with K5ND. This antenna can fit in your backyard and works great six-meter DX.

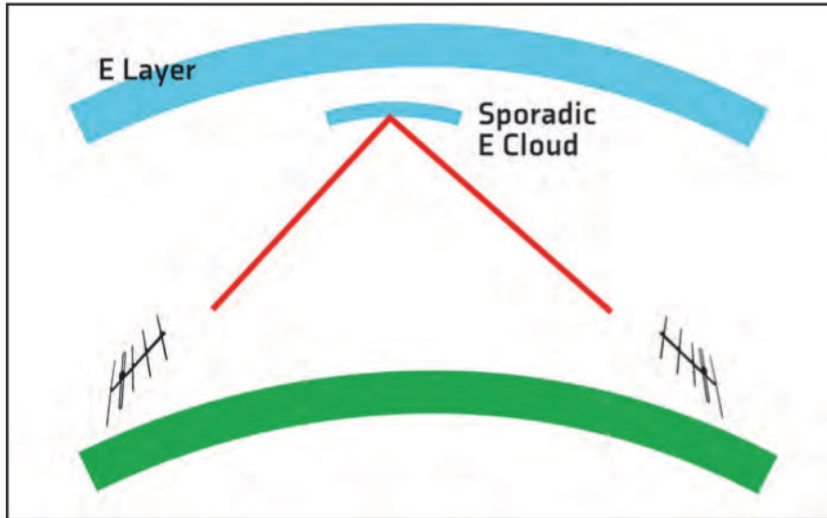


Figure 1. Sporadic-E happens near the ionosphere's E layer in what are thought to be ionized clouds. Now that is real magic; we don't even know why it happens!



Photo B. Six-meter Stressed Moxon from Par Electronics. Compact at 84 x 31 inches and lightweight.

triple hop, which can take your signal across the country or (depending on your location) across an ocean.

As with HF, there is also propagation via the F₂ layer of the ionosphere. Unfortunately, this is usually limited to the peak of the sunspot cycle, but that's some genuine magic with world-wide propagation.

Next, we get into the more esoteric modes of propagation, which includes *meteor scatter*. Here, meteors entering the Earth's atmosphere light up the E layer. This provides a path for six-meter signals, as well as higher VHF signals.

There is also *ionoscatter*, in which signals reflect from disturbances in the ionosphere.

Trans-Equatorial Propagation (TEP) happens when the signal literally jumps the Earth's magnetic equator. Stations in Argentina become armchair copy here in Texas when that happens.

There is also *tropospheric enhancement*, or tropo, when the weather provides a thermal inversion. This bends the RF signal near the earth's surface. While this does happen on six meters, it's more prevalent on the higher VHF bands.



On the Cover

This month's cover is graced by Christopher Tenev, K2QFA, of Lambertville, New Jersey, operating QRP-portable from ski slopes in Vail, Colorado (see his "QRP Quickie" story on page 12).

"I've always loved portable operation," says Chris, "whether it's QRP HF DXing on a mountain or on the water, or operating weak-signal VHF terrestrial and QRP UHF EME (Earth-Moon-Earth) out in a field here in New Jersey. I greatly enjoy traveling and experiencing different climates and terrains, and I find a lot of joy in bringing these experiences together with radio operation to explore the natural wonders of the Earth and electromagnetic radiation."

Chris was raised in central New Jersey and introduced to amateur radio by his grade-school computer teacher, Steve Gingo, KB2RMS. But he says it took a while — and a world-class VHFer as a mentor — to get licensed.

"As an adult, I worked as a music production engineer," Chris continues, "and after developing an interest in electronics, I decided to pursue a degree in electrical engineering. At The College of New Jersey, I met Dr. Al Katz, K2UYH, whose instruction in communications and microwave engineering inspired me to finally get my ham radio license." (*Al is a pre-eminent EME operator and a former CQ magazine VHF editor — ed.*)

Chris concludes, "I now work with Al as an RF and microwave engineer, designing specialized transmitter equipment for satellite communications systems. My interests in ham radio communications range from VHF, UHF, and microwave weak-signal work to HF DXing and VLF experimentation. New and more efficient communications technology are always front-of-mind." (*Cover photo by Nicholas Tenev*)

Then there is *moon-bounce* or Earth-Moon-Earth (EME). Here, signals bounce off the surface of the Moon. That takes some power and high-gain antennas.

Equipment for Six Meters

First, push the six-meter button on your existing HF rig, 100 watts is sufficient power to start making contacts. Then you need to plug in a six-meter antenna, which is quite a bit smaller than an HF Yagi.

Suitable antennas can include a dipole at 9 feet in length, or a small beam (*Photo A*) with a low-cost television rotator. Not only that, but the antenna doesn't need to be all that high in the air. In fact, most consider about 30 to 40 feet high to be best for six meters. But don't let that hold you back. Many are operating at far lower heights on simple pushup masts — my rover antenna is at 12 feet.

With my station at home, I've managed to get on the air with both verticals and dipoles that work fine. VHF weak signal modes are generally conducted with horizontally-polarized antennas. But I've found that verticals can be quite effective on six-meter E_s. In fact, I've worked over 100 grids, including Scotland and the Canary Islands, using a vertical dipole.

Even so, my favorite antenna is a six-meter Moxon (*Photo B*). This is a small two-element beam that's pretty easy to place on a television antenna rotator on a push up mast. I've

used this at home and on my VHF contest rover. In fact, on my VHF rover I've used a painter pole for the mast along with an *armstrong rotator*, rotating the mast by hand.

Six-meter Yagis are relatively small, particularly compared to HF tri-banders. While you can add elements for more gain, a 3-element Yagi offers gain, directivity, and a wide beam width to catch changing propagation.

Operating Options — SSB, FM, FT8, MSK144, and More

At this point, many of the stations on six meters are using WSJT-X's FT8 mode, although we may start seeing some FT4 soon. There is also quite a bit of meteor scatter using the MSK144 mode of WSJT-X. You will hear old-time VHF operators lament that both CW and SSB have nearly disappeared.

While hanging out on the FT8 frequency of 50.313 MHz may be *de rigueur* these days, it's wise to look at the standard calling frequencies from time to time, particularly during E_s openings. Those frequencies are 50.125 MHz for SSB and 50.100 MHz and below for CW. There are also CW beacons below 50.080 MHz. Note that 50.100-50.125 MHz is the DX window. Don't call CQ there. But do try calling CQ on the standard calling frequencies and see what happens.

FT4 happens on 50.318 MHz, MSK144 on 50.260 MHz. The designated window for U.S. to Europe FT8 contacts is

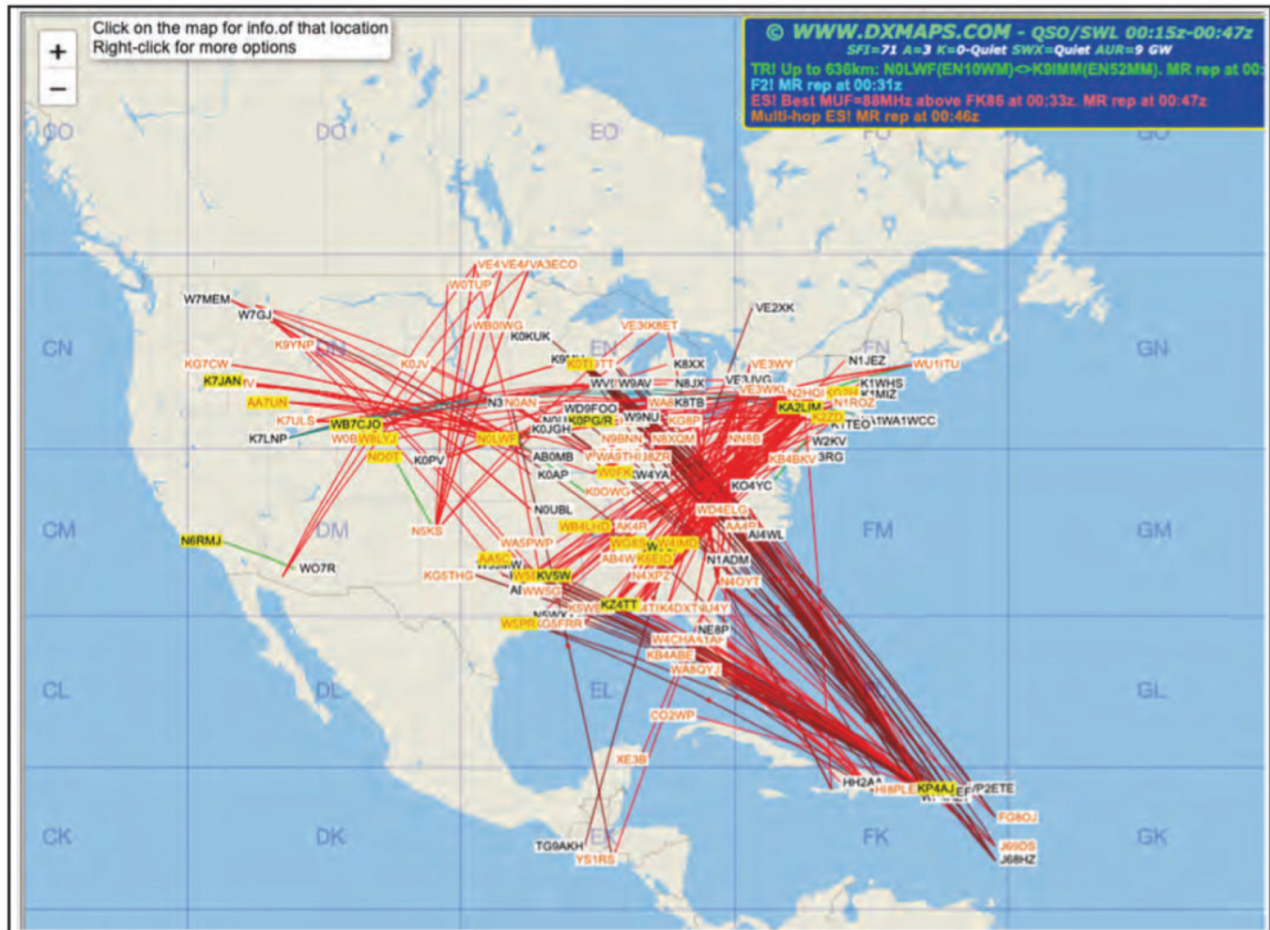


Figure 2. Display from DXmaps.com of six-meter openings across the U.S. and into the Caribbean. (Courtesy of DXmaps.com)

50.323 MHz. On that frequency, North American and Caribbean stations operate on second or odd sequence (0:15 and 0:45 seconds). The European stations operate on first or even sequence (0:00 and 0:30 seconds). Don't answer a U.S. station on that frequency. If you're not familiar with these sequences, check out FT8 operating guides online.

Watching for Openings

My favorite resource for finding and monitoring openings on six meters is DXmaps.com. This website processes all the spotted stations and plots them on a map. The map in *Figure 2* shows openings in the U.S. and into the Caribbean.

I use this to help me point my antenna and listen for DX. It's all fine and dandy to see these maps, but if you're not hearing anything, it at least gives you hope that something might happen soon.

The PSK Reporter system is also very useful. It consists of stations around the world tied into a large database, collecting and displaying received digital-mode contacts. You can select band and mode to watch. Another aspect of PSK Reporter is that it can pick up your signal, providing feedback on your station's reach.

Six Meter Operating Awards

If you're a paper chaser like me, looking for one more certificate to put on your shack wall, six meters has its fair share of awards. Most of them center around collecting maidenhead grids. These are 1° latitude by 2° longitude squares. My home grid is EM12. Grids are roughly 70 miles by 100 miles in the U.S. (*Their size varies at upper and lower latitudes due to the curvature of the Earth.*)

Perhaps the biggest award of all is the ARRL's Fred Fish Memorial Award or FFMA. It honors Fred Fish, W5FF, who was the first to work all the 488 grids in the 48 contiguous U.S. states on six meters. Established in 2008, only 12 hams have earned it since that time. It's an extremely challenging award.

The VHF / UHF Century Club (VUCC) award requires working and confirming QSOs with stations in 100 maidenhead grids on six meters. There are no mode endorsements (CW, Phone, etc.) but you can continue to add grids in increments of 25 to earn additional stickers for your certificate. VUCC is on a band-by-band basis. So there are separate awards for higher VHF-UHF and microwave bands as well as for satellite QSOs.

Of course, Worked All States (WAS) and DXCC also offers six-meter awards. They are just a bit more challenging for average stations.

Get On the Air and Try it Out

All it takes, as noted above, is to press the six-meter button on your rig and connect some sort of antenna for the band. It really is surprising what you can work with a very simple antenna when the band is open. Watch DXmaps.com for the openings.

You can also try some of the VHF contests for increased activity. The ARRL VHF contests happen in January, June, and September. The CQ World Wide VHF Contest is in July. The June and

July contests happen during E_s season, so they can be particularly attractive for working new stations, states, and grids. The CQWW VHF Contest also has a six-meter, single-band category.

As with any aspect of amateur radio, there is so much to explore and learn on the Magic Band. You can start with the various propagation modes and optimizing your system and operating practices. It's also relatively easy to experiment with homebrew antennas.

I recommend, "ready, fire, aim." Make some contacts with what you have. If you find the magic, then engage in further "aiming" through improvements to your station and operating practices.

See you on the Magic Band.

BEHIND THE BYLINES ...

... a little bit about some of the authors whose articles appear in this issue

Ben Cahill, AC2YD ("QRP Quickies: What Two Watts Can Do," p. 10), recently returned to ham radio after a 45-year absence. Originally licensed in 1970 as WN2PWS, Ben says he still has his QSL cards from back then, and was able to be sure he was on the air this past September 26th to celebrate the 50th anniversary of his first contact.

Dennis Lazar, W4DNN ("How a Burned-Out Transistor Launched Me Into the World of QRP," p. 16) is a semi-retired doctor of naturopathy and former CQ QRP Editor. Dennis has written for multiple ham magazines over the course of many decades. He lives in Florida with his wife, Ruthie, K4KLQ (his former callsign!).

Hiroki Kato, AH6CY ("The Squirrel Zapper," p. 22), has written several articles for CQ in the past, mostly focused on clandestine radios used during World War II, particularly the Paraset. Kato has just written a book on that subject. "The Paraset Radio: The Story of a WWII Spy-Radio and How to Build a Replica" is published by the Radio Society of Great Britain and is reviewed in this issue's QRP column (p. 68) by KA8SMA.

"Portable QRP Satellite Operation," p. 26, is the third CQ article for Mike Herr, WA6ARA. He also wrote "Satellites and the QRPer" for our 2014 QRP Special and "Build a Straight-Key CQer" in 2019. He's got a couple more in the pipeline, so stay tuned!

Murray Green, K3BEQ ("Streaming Video Over Internet Protocol (SVOIP) for Amateur Radio," p. 52) also wrote about "Peanut for Amateur Radio," another way in which amateur radio and the internet are becoming intertwined, in our August 2020 issue. He has shifted his hamming from direct on-air activity to internet-based contacts after nearly 70 years due to family issues.

Jim Wilson, K5ND, guest editor for this month's VHF-Plus column (p. 92), is focused on VHF-UHF contesting as a rover outside of his all-consuming 6-meter DXing addiction. He's also an active blogger, writing on a wide range of amateur radio topics at <www.k5nd.radio>. He began his writing for Wayne Green at 73 magazine in 1976. He went on to produce Heathkit's Amateur Radio General License course with Koch method code tapes in 1978. He's also supported amateur radio in Scouting at the national and world levels for Jamboree on the Air and served as president of the K2BSA Amateur Radio Association. Jim has written two e-books on six meters, "Capture the Magic of Six Meters" <<https://tinyurl.com/yd356vl9>> and "Guide to 6-Meter DXing — Getting Started on the Magic Band" <<https://tinyurl.com/y87t1p5>>.



Author Murray Green, K3BEQ, and great-granddaughter Olivia.